## REMARKS

### *Summary of Amendments*

In the specification, including the abstract, every instance of garbled text has been amended.[1]

In the claims, claims 1 and 7 have been amended to correct the same garbled text problem, and for editorial clarity, claims 2 and 3 have been revised as suggested by the examiner. The rest of the seventeen pending claims remain in their original form as filed.

### *Specification*

The disclosure was objected to because of informalities in that the instances in which the Greek letter *lambda* ($\lambda$)—as correctly inferred by the Examiner—or *alpha* ($\alpha$)—as the intended angle notation—was supposed to appear were garbled as "□". The garbled text has been appropriately corrected in amendments amounting to formal corrections only; of course no new matter has been added.

The illegibility of $\lambda$ and $\alpha$ in the present case has been found by Applicant's undersigned representative to be an artifact of the submission of the present application by means of the USPTO's Electronic Filing System. When the present application was electronically filed, versions of the specification printed out via browser display and via "ePAVE" (the USPTO's proprietary electronic submission software)—and still viewable—on Applicant's end did not then, and do not now, contain illegible text. The helpdesk at EFS has confirmed that if garbled-text-containing specifications on the EFS server are opened off-server (i.e., on another machine), then the garbled text no longer appears.

### *Claim Objections*

Claims 1 and 7 were objected to for the same garbled text problem that led to the above-discussed objection to the specification. The garbled angle notation in claims 1 and 7 has been appropriately corrected in revisions amounting to formal corrections only.

Claims 2 and 3 were objected to for informalities in that a phrase common to each was grammatically incorrect. This phrase in both claims 2 and 3 has been amended as kindly suggested by the Examiner.

---

[1] **Please note that in making these amendments, the paragraph numbering that has been followed is that of the IFW/PALM version, not the XML version published by the Publication Division.**

***Rejections under 35 U.S.C. § 103***

Claims 1, 2, 14 and 16; Noda et al. '277 in view of "Terajima" et al. '329

Claims 1, 2, 14 and 16 were rejected as being unpatentable over U.S. Pat. App. Pub. No. 2002/0009277 to Noda et al., in view of Japanese Unexamined Pat. App. Pub. No. 2001-242329 to "Terajima" (who is the third-listed inventor—the last name of the first-listed inventor is Hashimoto, thus this reference will be referred to as "Hashimoto et al.").

Under this section the Office action acknowledges that Noda et al. discloses neither a second 2D photonic crystal as recited in claim 1 of the present application, nor means as recited therein for optically connecting the first and second waveguides that are features of the first and second 2D photonic crystals,

> so that when the principal plane of said first 2D photonic crystal and the electric-field vector of the light within said first waveguide form an arbitrary angle $\alpha$, the principal plane of said second 2D photonic crystal and the electric-field vector of the light within said second waveguide form an angle of $\alpha + (\pi/2)$.

- Claim 1 is directed to the embodiments of Figs. 1 and 2, in which the first and second waveguides are connected in series. (Independent claim 7, which has been allowed, is directed to the embodiments of Figs. 3 and 4, in which in which the first and second waveguides are connected in parallel.)

It stands to reason that the means, recited in claim 1, "for optically connecting said first and second waveguides in series" must be generic to the recitations in claims 2 through 6 of how that connection is accomplished.

- Claim 2 is directed to an embodiment related to Fig. 1, in which the principal planes of the first and second waveguides are orthogonal to each other, but in which the waveguides are connected directly to each other, not via a polarization-maintaining fiber as illustrated in the figure.

- Claim 3 is directed to the Fig. 1 embodiment in which the waveguides are connected in series via a polarization-maintaining fiber. Meanwhile, claim 4 is directed to an embodiment of Fig. 2, in which the principal planes of the first and second waveguides are parallel to each other and the waveguides are connected in series via an axially twisted polarization-maintaining fiber. Finally, claims 5 and 6 are directed to the Fig. 2 embodiments in which the waveguides are connected in series via a Faraday rotator or a half-wave plate.

Claims 3 through 6 have been indicated as being allowable, save for their dependency on rejected base claim 1.

This is an acknowledgement of the patentability of both the structure, and the functionality achieved by that structure, of claim 1 embodiments wherein the "means for optically connecting said first and second waveguides in series" are as set forth in claims 3-6.

Thus, in rejecting claim 2 the Office action is alleging that the structure, and the functionality achieved by that structure, of a claim 1 embodiment wherein the "means for optically connecting said first and second waveguides in series" is as set forth in claim 2 is obvious over the teachings of Noda et al. in view of Hashimoto et al.

Applicants note that Hashimoto et al., as recited in claims 1 and 2 therein, features laminating a plurality of two-dimensional waveguides basically in parallel to configure the optically active device. Specifically, unit group 2a is composed of a laminated complex of base units 1 that each include numerous waveguides 1b utilizing photonic crystals 1a, and delay means 1c. If not thus structured, the Hashimoto et al. device could not fulfill the role of a "space-time information converting, optically active device," as termed therein.

In contrast, the present invention does not employ 2D photonic crystal waveguides by laminating them. The present invention demonstrates its effects by a single layer (slab) alone.

Applicants further point out that functionally, the aim of the Hashimoto et al. patent is spatial conversion (a space-time information converting, optically active device), and toward that end, a structure in which a number of 2D waveguides are combined orthogonal to each other is adopted. Specifically, a base unit 2b, consisting of a single base unit 1—which as noted above contains numerous waveguides 1b utilizing photonic crystals 1a—is disposed orthogonal to, and in close contact with, the unit group 2a to form optically active device 2.

In contrast, in the present invention the objective of combining orthogonally to each other two 2D photonic crystal waveguides is for polarized-wave compensation; the present invention is not directed to spatial conversion. (Actually, in using the invention as a polarized-wave compensation device, the assumption is that the signals outputted in directions orthogonal to each other will be added together at a later stage.)

Thus, the functionality toward which the Hashimoto et al. technology is directed is fundamentally different from that toward which the present invention is directed, and as a consequence, a person skilled in the art acting on the teachings of the Hashimoto et al. reference would be motivated to seek device structures that

achieve spatial conversion of optical waveguide input, not the polarized wave compensation that a channel add/drop filter of the present invention achieves.

It is respectfully submitted therefore that the person skilled in the art acting on the teachings of the Hashimoto et al. reference would not be motivated to combine Noda et al. waveguides after the manner of Hashimoto et al.

Moreover, claims 1 and 2 have been rejected over Noda et al. *in view of* Hashimoto et al., which requires that a *prima facie* case be made that 1) Noda et al. suggests the desirability of combining two of their waveguides; and 2) combining waveguides in the manner taught by Hashimoto et al. not only is along the lines of such a suggestion, but also would lead a person skilled in the art to a reasonable expectation of successful functioning of the combination.

Yet Noda et al. make no such suggestion—the only mention they make of combining their 2D photonic crystal multiplexer/demultiplexer slab with other devices is in their third embodiment, illustrated in Fig. 7 of the reference, and a modification of that embodiment, illustrated in Fig. 8. In the Fig. 7 instance, the photonic crystal slab is combined with optical fibers: Light entering the waveguide 12 and trapped in point defects 32-34 exits the defects and "is introduced into optical fibers 35 to 37 disposed above the point defects" (paragraph [0064]). In the Fig. 8 instance, the photonic crystal slab is combined with, instead of optical fibers, "semiconductor devices having a photoelectric conversion function for example, photodiode arrays 45 to 47" (paragraph [0065]).

Since Noda et al. do not 1) suggest any desirability of combining two of their waveguides, the issue of 2) whether the Hashimoto et al. manner of combining waveguides follows such a suggestion and leads to a successful device is moot.

And as explained above, because the Hashimoto et al. reference is directed to a device having a totally different functionality—spatial conversion of the input optical signals—the reference lacks any teaching or suggestion to motivate the skilled practitioner in the art to combine Noda et al. multiplexer/demultiplexer slabs in the manner of the present invention.

In sum, the Noda et al. and Hashimoto et al. references have been cited to reject claims 1 and 2 not over the structural combination of the Noda et al. and Hashimoto et al. devices, nor any portion of either of the devices, but to allege (in hindsight) that Hashimoto et al. teaches the claim 2 manner of combining first and second 2D photonic crystals as recited in claim 1. Yet Hashimoto et al. does not: Applicants state that from the foregoing, it is evident that the invention in this instance, that is, enabling polarized-wave compensation, is based on a completely novel concept one to which simply combining the Noda et al. and Hashimoto et al. references alone could not give rise.

That concept is realized by a channel add/drop filter as recited in claim 1 that in an embodiment in which its "means for optically connecting said first and second waveguides in series" is as set forth in claim 2 has been shown not to be obvious over the teachings of Noda et al. in view of Hashimoto et al.

And by extension, claim 1—generic to claims 3-6, indicated in the Office action as being allowable, and as argued above, to claim 2 as well—has been shown to be non-obvious over Noda et al. in view of Hashimoto et al.

Lastly, it is respectfully submitted that since for the foregoing reasons claim 1 should be held allowable, claims 14 and 16, which each depend directly from claim 1, should also be.

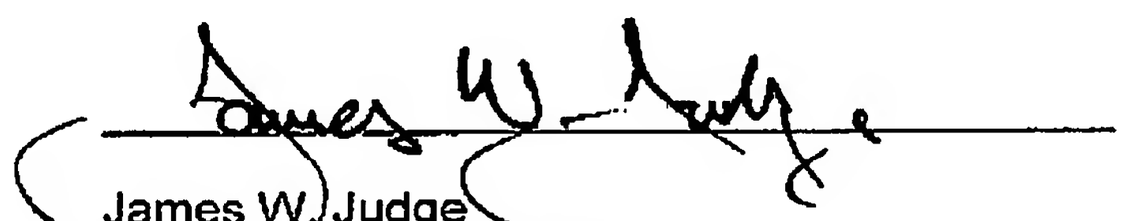
***Allowable Subject Matter***

Applicant gratefully acknowledges that claims 3-6 were indicated as being allowable if rewritten in independent form, and that 7-13, 15 and 17 would be allowable if amended to remedy the garbled text. These latter claims have been so amended, and for the reasons set forth above, it is respectfully submitted that not only claims 3-6, but also their parent claim 1 and sister claim 2 are allowable.

Accordingly, Applicant courteously urges that this application is in condition for allowance. Reconsideration and withdrawal of the rejections is requested. Favorable action by the Examiner at an early date is solicited.

Respectfully submitted,

September 27, 2005



James W. Judge
Registration No. 42,701

JUDGE PATENT FIRM
Rivière Shukugawa 3rd Fl.
3-1 Wakamatsu-cho
Nishinomiya-shi, Hyogo 662-0035
JAPAN

Telephone: 305-938-7119
Voicemail/Fax: 703-997-4565